

Water Quality
Record is Sep 76

4-5

OLD RIVER CLOSURE

1974

This is to document the activities of the Department regarding the closure of Old River near its head by the construction of a temporary rock control structure. The purpose of this closure is to promote salmon migration up the San Joaquin River by providing positive downstream flow and by eliminating a deficiency in dissolved oxygen near Stockton.

In accordance with the Interagency "Memorandum of Understanding of Interim Measures to Protect Fish in the Sacramento-San Joaquin River Delta Prior to the Construction of the Peripheral Canal", dated March 10, 1969, the responsibilities of the involved agencies related to the Old River Closure (when it is mutually determined that the closure is necessary) are as follows:

The Department of Water Resources is responsible for the construction and removal of the control structure at the head of Old River. Funds are available for this purpose in the Division of Operations and Maintenance budget, and work is done by contract through the Division of Design and Construction. Monitoring of the dissolved oxygen content in the San Joaquin River to determine the need for flow augmentation is coordinated by the Central District as a participant to Division of Operations and Maintenance. The District also obtains the necessary permits and coordinates the overall activity.

Flow augmentation of the San Joaquin River through the Delta Mendota Canal wasteways is the responsibility of the

U. S. Bureau of Reclamation. When necessary, the Bureau is prepared to augment the flow in the San Joaquin River up to a total of 60,000 acre-feet.

The Department of Fish and Game is responsible for evaluation of these protective measures in coordination with the U. S. Fish and Wildlife Service. Fish and Game is also responsible for planting salmon stock and for monitoring temperature conditions in upstream areas.

1974 Activities

Representatives of the Department of Water Resources, Department of Fish and Game, U. S. Fish and Wildlife Service, and U. S. Bureau of Reclamation decided in an April 9, meeting and in a June 13, letter that, "it would be wise to proceed with installation of Old River Closure" for 1974. This decision was based on projected high export rates at the federal and state pumping plants and the anticipation of a much smaller salmon run than last year's (1973).

Construction of the control structure was started September 12, and completed September 18, 1974. Because of higher than anticipated flows, the structure did not stabilize until September 23. Removal was started November 1, and completed November 9, 1974. Final inspection was performed by the Department's Flood Control Surveillance Section and Construction Inspection Section on November 12, and the contractor was notified of acceptance of the work November 14, 1974.

For the week prior to closure (September 5-11), flow in the San Joaquin River at Mossdale averaged about 2,200 cfs.

With that flow and a combined pumping rate of about 4,700 cfs at Tracy and Delta Pumping Plants, it was determined, using the distribution curve of flow at the head of Old River, ^{1/} that the flow split was about 1,800 cfs down Old River and only 400 cfs down the San Joaquin River toward Stockton.

Flows in the San Joaquin River during the closure period were higher than expected and ranged between 2,600 cfs and 5,300 cfs (see Plate 1). The higher flows were due to unanticipated climatic conditions and upstream operations. *again?*

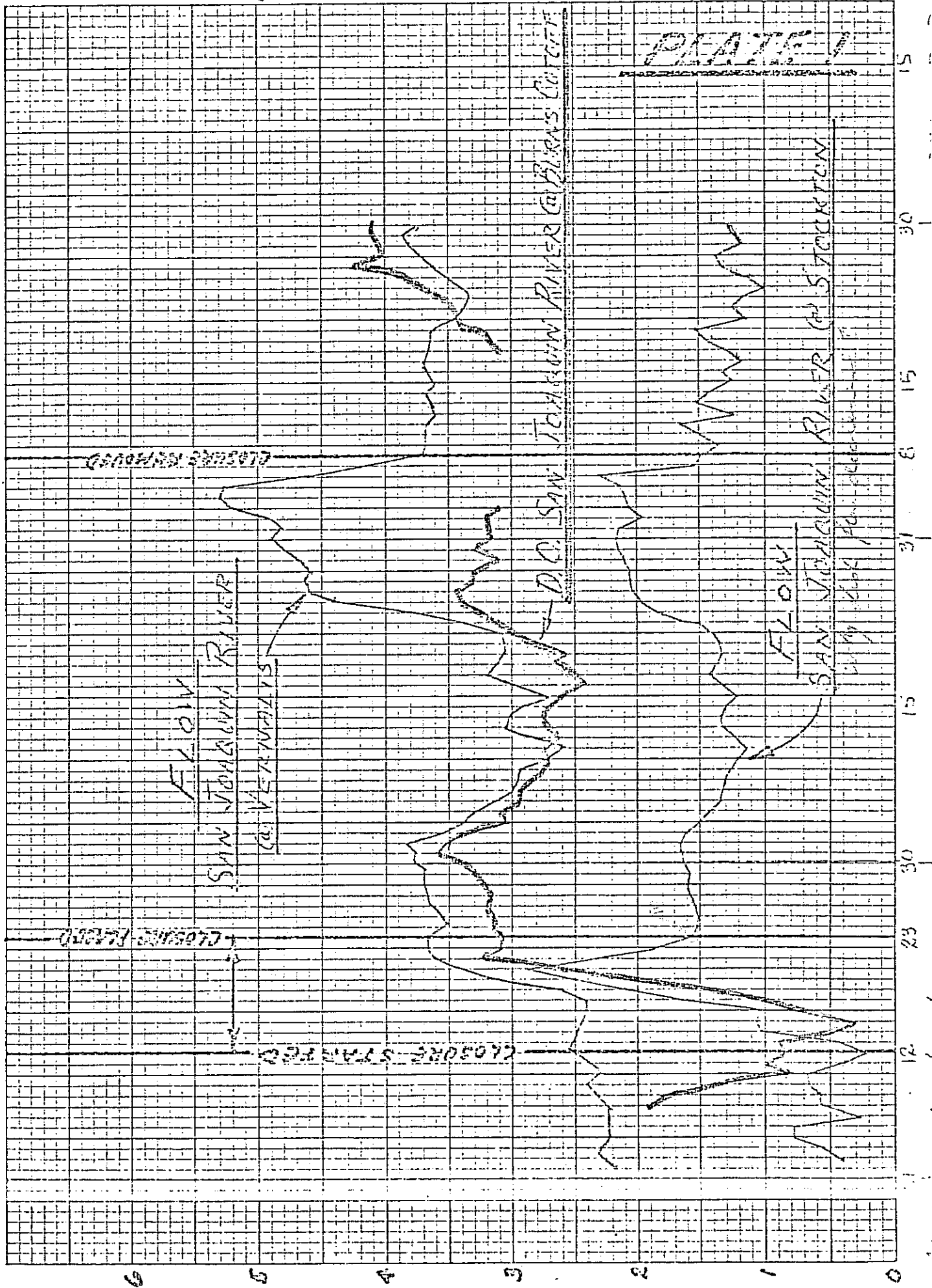
Tidal cycle measurements were made on September 23, to determine the flow split between the San Joaquin and Old Rivers with the closure in place. This measurement showed the split, with 3,600 cfs in the San Joaquin River at Vernalis, to be approximately 45 percent SJR-55 percent OR. Assuming the same ratio at other flows, the flow in the San Joaquin River below the closure averaged about 1,670 cfs during the 1974 closure period as compared to about 1,200 cfs in 1973 and 1,750 cfs in 1972.

In order to document changes in water quality resulting from installation of the control structure, an interagency water quality monitoring program was organized and implemented. The monitoring program extended from September 6, to November 13, 1974, and consists of five dissolved oxygen sampling runs on the San Joaquin River from Light 18 near Turner Cut to Mossdale, and weekly retrieval of dissolved oxygen data from the DWR

^{1/} Salinity Incursion and Water Resources Appendix to Bulletin No. 76, Plate 11.

10 X 12 TO THE INCH
7 X 10 INCHES
KEUFFEL & ESSER CO.

D.O. vs Flow in the San Joaquin River - 1974 Closure

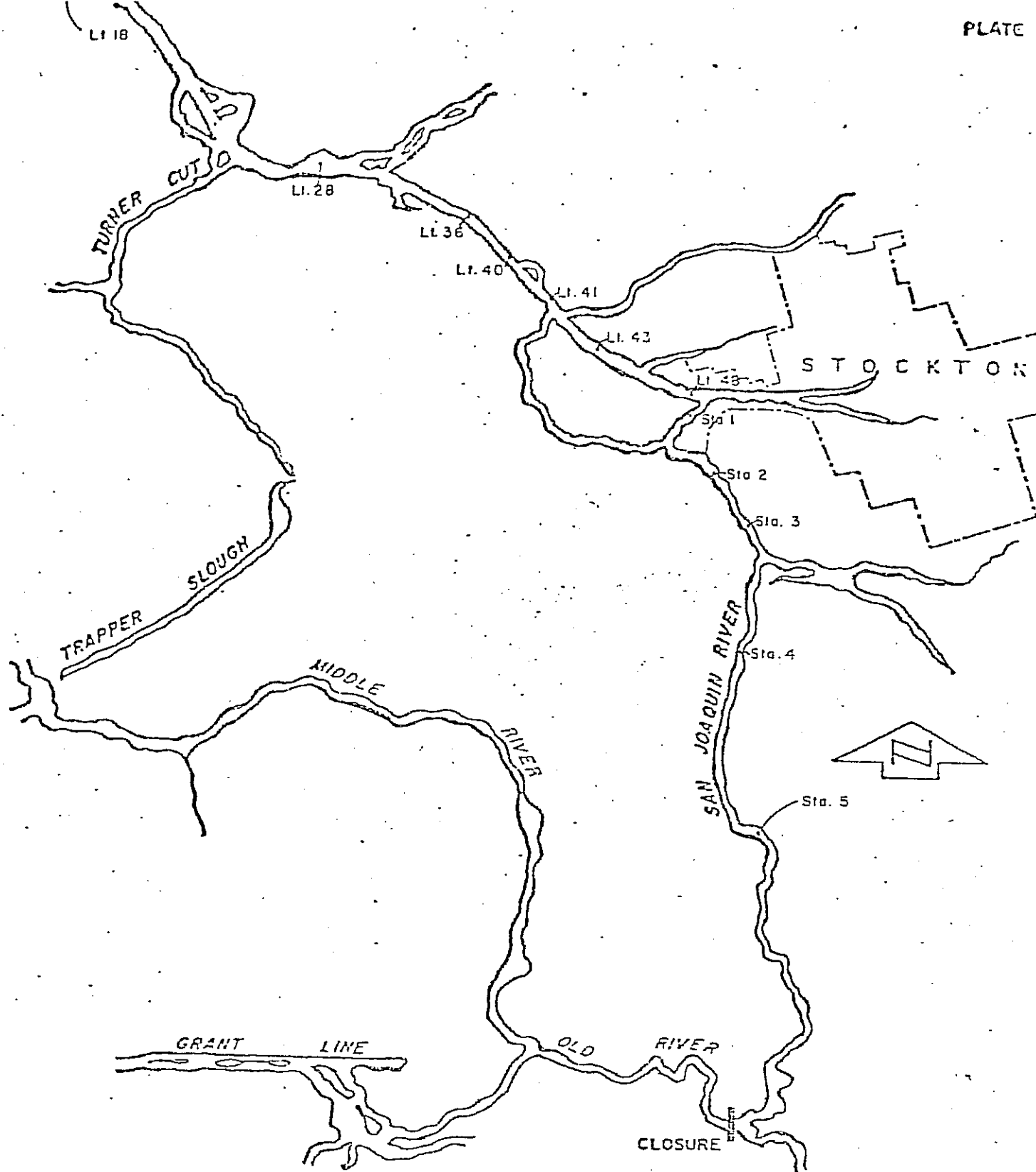


continuous recorder at Rough and Ready Island. Plate 2 indicates the approximate location of the sampling stations.

Two sampling runs were made prior to the construction of the control structure, two while the structure was in, and one after the structure's removal. Data collected on selected runs on the San Joaquin River between Light 18 and Brandt Bridge are presented in Table 1, and graphically shown on Plate 3. A companion memorandum report will be prepared that presents a more detailed analysis of all of the water quality data collected during the closure period.

During each of the sampling runs, a continuous profile of dissolved oxygen values was obtained in the deep water channel, beginning at Light 18 and extending to Light 48. These profiles indicate that no unusual conditions exist between sampling points. The runs were made as close to low slack water and sunrise as feasible. Sunrise was used since the lowest dissolved oxygen values could be expected at around daybreak due to the extended nighttime period of nonphotosynthetic production. Low slack water was used because during this tide condition, the length of the sag (area of low dissolved oxygen) was expected to be at its maximum. Between Light 18 and Light 48, two samples were taken at each site -- 3 feet above the bottom of the channel, and 3 feet below the surface. Upstream of Light 48, samples were taken at 3 feet below the surface.

The effect of this year's closure was quite noticeable on dissolved oxygen levels near Stockton. Another contributing factor would have to be the increase in flow of the San Joaquin



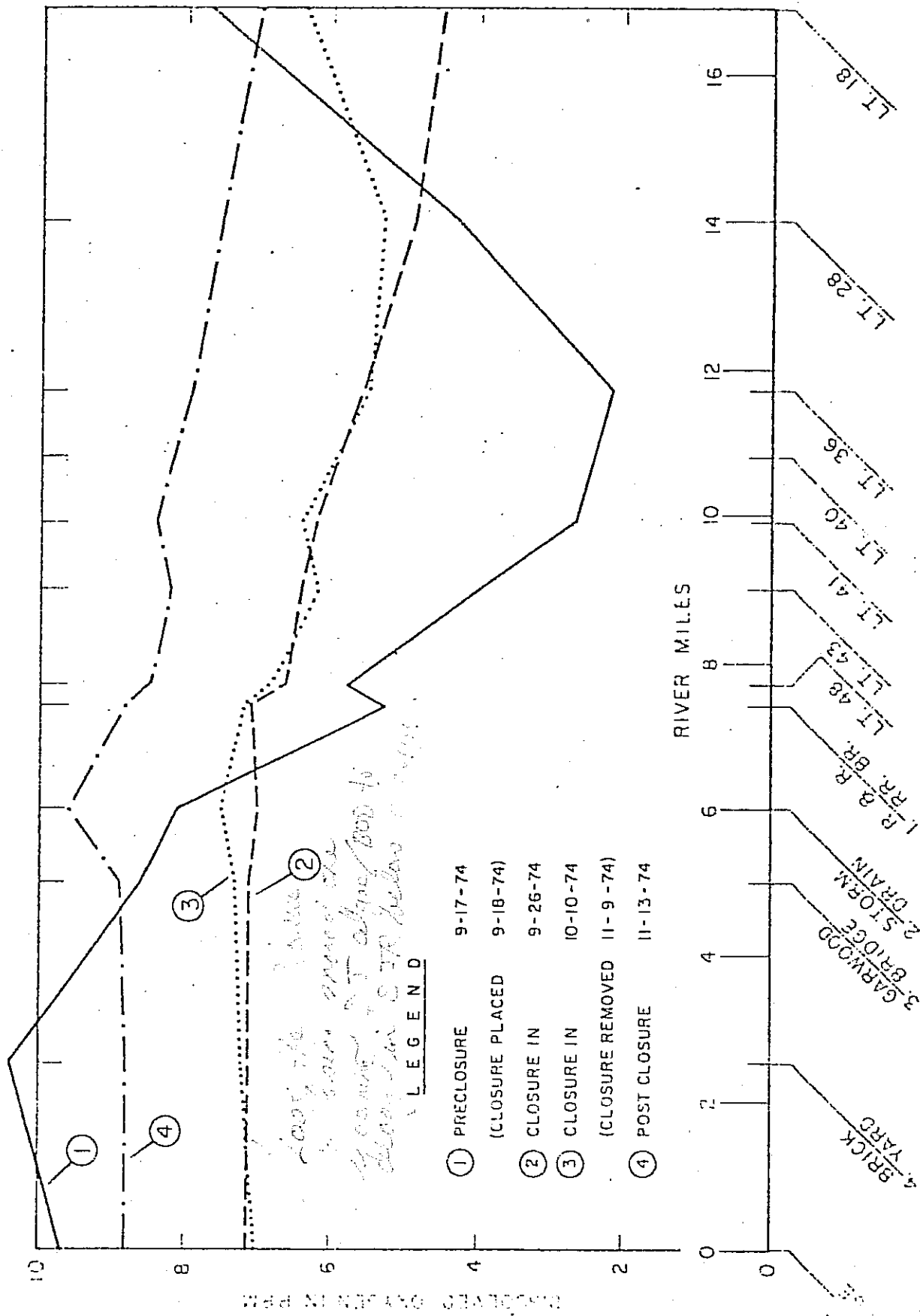
SAN JOAQUIN RIVER NEAR STOCKTON
SAMPLING STATIONS

TABLE 1

DISSOLVED OXYGEN VALUES FROM SAMPLE RUNS
(Values are in ppm)

Station	Date 1974				
	9/6	9/17	9/26	10/10	11/13
Lt. 18 ^{RM} 30.6	8.3 7.1	7.8 7.6	4.2 4.8	7.8 5.0	7.0 7.1
Lt. 28 30.2	8.4 7.5	4.6 3.9	4.8 5.0	5.4 5.2	7.5 7.5
Lt. 36 35.5	7.7 4.6	2.7 1.6	5.6 5.6	5.5 5.5	7.9 7.9
Lt. 40 36.4	6.7 4.2				
Lt. 41 37.3	4.0 4.7	3.3 2.1	6.3 6.0	6.5 6.3	8.2 8.6
Lt. 43 38.2	3.9 3.9	4.6 3.4	6.4 6.4	6.7 5.8	8.4 7.9
Lt. 48 39.6	6.4 5.3	8.6 5.8	6.6 6.7	6.7 6.9	8.6 8.4
1. R.&R. RR Bridge 40.1	5.6	5.3	7.1	7.2	8.8
2. Stockton Storm Dr. 41.5	8.0	8.1	7.0	7.5	9.6
3. Garwood Bridge 42.1	8.2	8.6	7.1	7.3	8.9
4. Brick Yard 44.0	8.9	10.4	7.1	7.2	8.8
5. Brandt Bridge 47.5	9.5	9.7	7.1	7.0	8.8

Note: Lt. 18 through Lt. 48: first number 3 feet below water surface, second number 3 feet above bottom. All others, 3 feet below water surface.



D.O. CONDITIONS IN SAN JOAQUIN RIVER, NEAR STOCKTON, DURING STUDY PERIOD

River about the same time (see Plate 1, page 4). During the closure period, the dissolved oxygen remained satisfactory, and appeared to vary directly with flow in the San Joaquin River. Since dissolved oxygen levels responded satisfactorily to the closure and flow in the river, no augmentations were made from the Delta Mendota Canal.

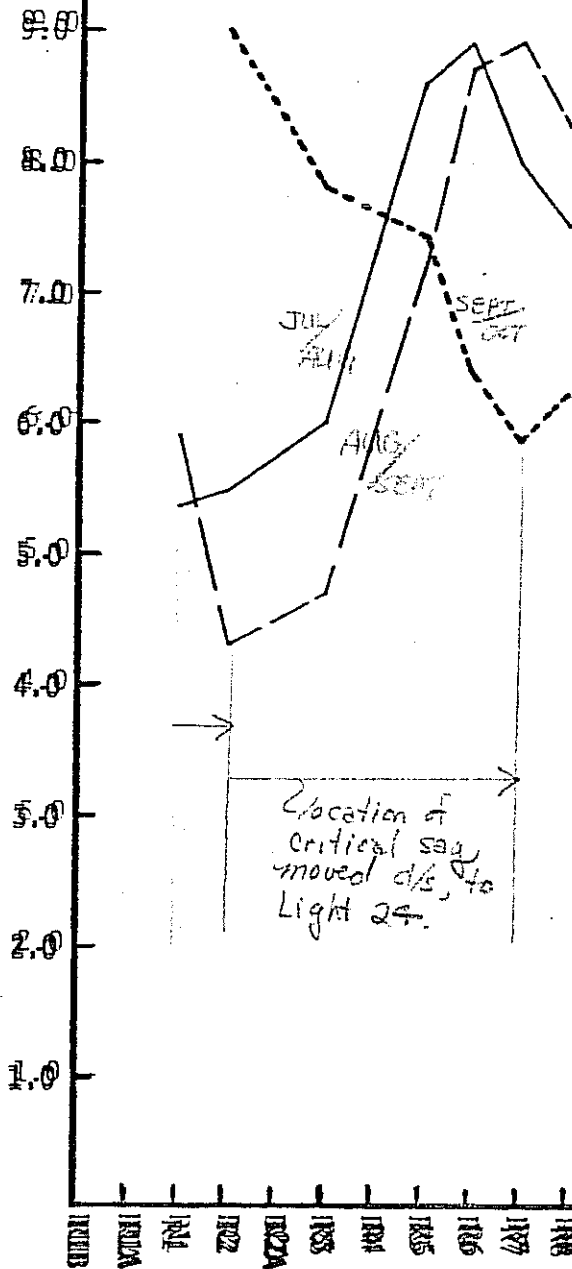
Preliminary information on the 1974 San Joaquin River system salmon run from Fish and Game indicates:

500	Spawners on Stanislaus River
1,000	Spawners on Tuolumne River
2,000	Spawners on Merced River
<u>3,500</u>	Total Spawners SJR System

The 1974 run was the poorest since 1966. Although a reduced spawning escapement was anticipated, the amount of reduction was unexpected. The first spawner observed at the spawning beds was estimated to have passed through Stockton or vicinity about October 6. The main group of spawners was estimated to have passed through the Stockton area between October 16, and 20.

This is the first time that the Merced River count has exceeded the other spawning beds. It is probably due to an increased planting in the Merced River.

mg/mg/l



Are these
average daily?
Average water
column?

Location of
critical sag
moved d/s to
Light 25.

JULY 3 - AUGUST 20
AUGUST 21 - SEPTEMBER 10
SEPTEMBER 11 - OCTOBER 31

DISSOLVED OXYGEN, 1974

1974

Co.	Revised	By	APPROVED BY
Drawn by Checked by Exam			Date Brewer No.
CITY OF STOCKTON DEPARTMENT OF PUBLIC WORKS			

Dissolved Oxygen, mg/L

